

# 1975-79 EXHAUST EMISSION SYSTEMS

## Thermostatic Air Cleaners – All Manufacturers

### DESCRIPTION

All passenger cars use a system for preheating the air entering the carburetor. This device is part of the air cleaner and maintains the air temperature at a point where the carburetor can be calibrated much leaner to reduce Hydrocarbon (HC) emissions and also improve warm-up operations and reduce carburetor icing.

System consists of an air cleaner assembly, integral air control door, vacuum control temperature sensor, vacuum motor, heat shroud (on exhaust manifold) with connecting pipe and vacuum hoses. Some models use additional controls, such as vacuum traps and cold weather modulators.

Some American Motors, Ford and General Motors 4-cylinder engines use a thermostatic air cleaner system that does not use a vacuum motor to control the air control door. Door is controlled by a thermostatic spring only.

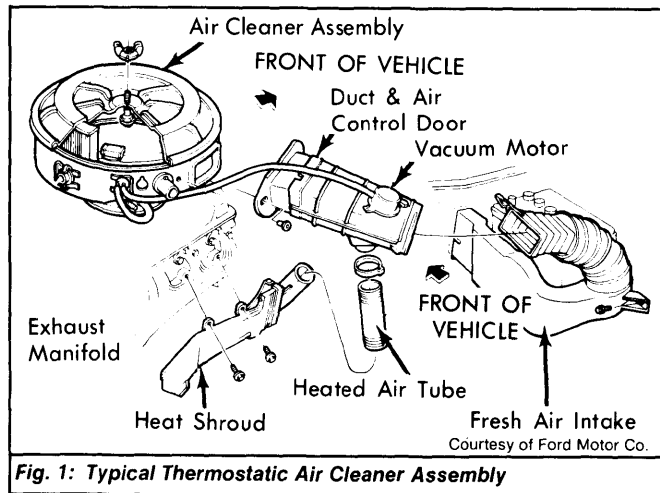


Fig. 1: Typical Thermostatic Air Cleaner Assembly

### OPERATION

When temperature of air entering air cleaner is less than the setting of temperature sensor, sensor closes to allow engine vacuum to operate vacuum motor which closes damper assembly to outside air. Air is then drawn from around exhaust manifold, through heat shroud and into air cleaner as heated air. As air inside air cleaner warms, sensor valve begins to open. This bleeds off vacuum to vacuum motor. As vacuum to vacuum motor drops, air control door begins to open, allowing outside air to enter air cleaner. When air

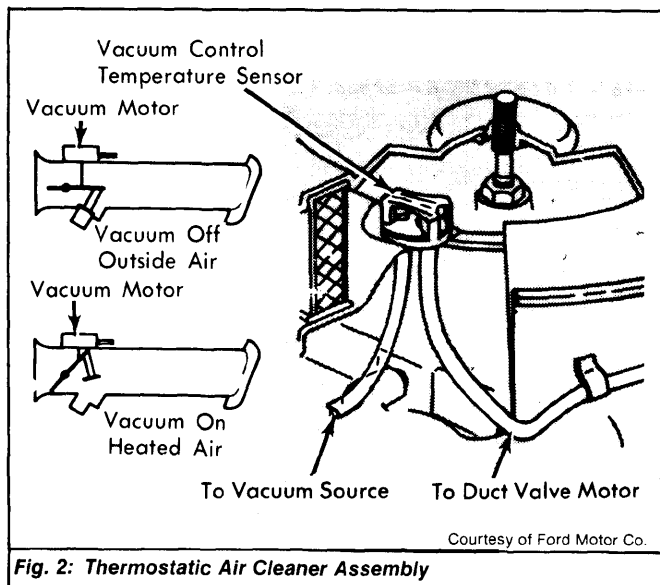


Fig. 2: Thermostatic Air Cleaner Assembly

entering air cleaner reaches a specified temperature, air control door opens completely, thus closing off heated air from around exhaust manifold.

On the General Motors 4-cylinder engines with thermostatic spring, the air control door will be in the heated air position whenever the temperature is 50°F or below. The door will be in the full outside air position (closed to heated air) whenever the sensor temperature is 110°F or above.

### AUXILIARY AIR INLET

**Ford Motor Co.** – Some models include an auxiliary air inlet valve. This is used during cold-engine wide open throttle operation.

### COLD WEATHER MODULATOR

**Ford Motor Co.** – Some vehicles have a vacuum modulator located in the air cleaner. During engine operations in cold weather, it prevents the air cleaner duct door from opening to non-heated intake air. When available outside air is above 55°F, the cold weather modulator does not operate. See Fig. 3.

### VACUUM TRAP

**General Motors** – Some vehicles are equipped with a built-in vacuum trap, designed to hold the air control door in the heated air position during full throttle if outside air is below 70°F. The length of time that the air control door is held closed depends on outside air temperature. The vacuum trap can be identified by a check valve in the small orifice leg of the temperature sensor.

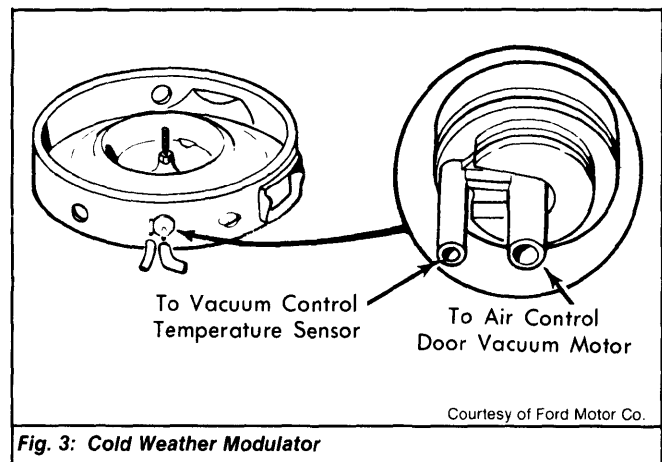


Fig. 3: Cold Weather Modulator

### DELAY VALVE

**1979 General Motors** – On V6 engines, a delay valve is used on the thermostatic air cleaner. During cold weather operation, and when under full or hard acceleration, the delay valve will postpone opening the air control door to outside air. The engine will continue to receive heated air for a short period to improve driveability.

### TESTING

**NOTE:** See specifications tables for correct specifications when performing the following tests.

# 1975-79 EXHAUST EMISSION SYSTEMS

## Thermostatic Air Cleaners – All Manufacturers (Cont.)

### AUXILIARY AIR INLET

- 1) Start engine and ensure vacuum motor plate is closed. Tee a vacuum gauge into vacuum hose. Ensure at least 10 in. Hg vacuum is present. If not, check motor diaphragm or vacuum hose for cut.
- 2) Disconnect vacuum hose. Plate should open. If not, check vacuum motor for binding.

### VACUUM CONTROL TEMPERATURE SENSOR TEST

- 1) Tape a thermometer close to the vacuum control temperature sensor, located inside the air cleaner. Leave wing nuts off of top of air cleaner so top can be removed quickly to check thermometer while performing tests.
- 2) With a cold engine, temperature below vacuum control temperature sensor specifications, check air control door in air cleaner. It should be in the full heated air position (closed to outside air).
- 3) Start engine and let run. Watch air control door. When door reaches full open position (outside air only), quickly take air cleaner top off and read thermometer. Compare thermometer reading with specifications. If reading is not to specifications, perform vacuum motor test before replacing sensor.

### VACUUM MOTOR TEST

- 1) With engine not running, air cleaner may be removed for this test. Disconnect vacuum hose from vacuum motor.
- 2) Connect an external vacuum pump to vacuum motor. Apply specified vacuum for Door Fully Closed. See AIR CONTROL DOOR OPENING VACUUM table.
- 3) Air control door should remain closed to outside air (open to heated air from shroud around exhaust manifold).
- 4) Next, apply specified vacuum for Door Fully Open in. Hg. See AIR CONTROL DOOR OPENING VACUUM table. Air control door should open to outside air (closed to heated air).
- 5) Apply 20 in. Hg vacuum to vacuum motor and pinch off hose. Vacuum should not leak down more than 10 in. Hg in 5 minutes. If vacuum motor fails any of these checks, replace it.

### AIR CONTROL DOOR OPENING VACUUM

Application	<sup>1</sup> Door Fully Closed Less Than In. Hg	<sup>2</sup> Door Fully Open Max. In. Hg
American Motors <sup>4</sup> .....		
Buick .....	4	6
Cadillac .....	4-6	3
Chevrolet <sup>4</sup> .....		7
Chrysler Corp.		
1.7L 4-Cyl. ....	2	4
All Others .....	5.5	8.5
Ford Motor Co. <sup>4</sup> .....		
Oldsmobile		
260", 350" (VIN R), 403" .....	3	5-7
All Others <sup>4</sup> .....	3-7	9
Pontiac <sup>4</sup> .....		7

- <sup>1</sup> – Closed to outside air (heated air position).
- <sup>2</sup> – Closed to heated air (outside air position).
- <sup>3</sup> – Manifold vacuum.
- <sup>4</sup> – Some American Motors, Ford Motor Co. and General Motors 4-cylinder engines do not use a vacuum motor.

### VACUUM CONTROL TEMPERATURE SENSOR SPECIFICATIONS

Application	Air Door Closing Temp. (°F)	Air Door Opening Temp. (°F)
American Motors <sup>3</sup> .....		
Buick .....	85	<sup>1</sup> 115
Cadillac <sup>2</sup> .....	85	105
Chevrolet		
Some 4-Cyl. <sup>3</sup> .....	79	123
Corvette .....	80	<sup>4</sup> 107
All Others .....	80	<sup>1</sup> 100
Chrysler Corp.		
1.7L 4-Cyl. ....	50	85
All Others .....	50	100
Ford Motor Co. <sup>3</sup>		
Sensor Color Code		
Brown .....	60	90
Black or Pink .....	60	100
Blue or Yellow .....	60	115
Oldsmobile		
Some 4-Cyl. <sup>3</sup> .....	79	123
231" V6 .....	79	123
260" V8 .....	75	105
301" V8 .....	77	123
305" V8 .....	79	123
350" V8		
VIN L .....	79	123
VIN R .....	75	105
403" V8 .....	75	105
Pontiac		
Some 4-Cyl. <sup>3</sup> .....	79	123
All Others .....	77	123

- <sup>1</sup> – ± 20°F.
- <sup>2</sup> – All except Electronic Fuel Injection Models.
- <sup>3</sup> – Some American Motors, Ford Motor Co. and General Motors 4-cylinder engines do not use a vacuum motor on air control door. Door is controlled by thermostatic spring only. At 50°F, door is open to heated air only. At 110°F, door is open to outside air only.
- <sup>4</sup> – ± 22.5°F.

### COLD WEATHER MODULATOR

- Ford Motor Co. – 1)** Cool modulator to 40°F. Connect an external vacuum source between modulator and a vacuum gauge, using a 24" length of ¼" I.D. vacuum hose.
- 2)** Apply a minimum of 16 in. Hg vacuum to vacuum motor side of modulator. Modulator must not leak down to less than 5 in. Hg in 30 seconds. If it does, replace the modulator.
- 3)** Warm modulator to at least 70°F (for Blue color modulator) or 80°F (for Green color modulator). If vacuum holds at this temperature, modulator is not functioning and must be replaced.